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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,857	07/28/2003	Toru Kato	0275M-000776	3845
27572	7590	11/02/2004	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303			REESE, DAVID C	
			ART UNIT	PAPER NUMBER
			3677	

DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.



**Office Action Summary**

Application No.

10/628,857

Applicant(s)

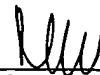
KATO ET AL.

Examiner

David C. Reese

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/31/2003</u> | 6) <input type="checkbox"/> Other: _____  |



## **DETAILED ACTION**

### ***Status of Claims***

**[1]** Claims 1-23 are pending.

### ***Drawings***

**[2]** The drawings are objected to under 37 CFR 1.83(a) because they fail to show T2 as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of



the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

**[3]** The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**[4]** Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 18 terminology states, "wherein the pair of workpieces have a first thickness..." renders the claim indefinite since "the pair of workpieces" is not claimed, and therefore, the "first thickness" is undefined. In addition, the phrase "of the 70%" should be, "of 70%."

***Claim Rejections - 35 USC § 102***

**[5]** The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.



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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**[6]** Claims 1-6, 8-9, 13, 14-18, and 19-22 rejected under 35 U.S.C. 102(e(1)) as being anticipated by Singh et al, U.S. Patent 6,385,843 B1.

As for Claim 1, Singh teaches of a self-penetrating fastening rivet comprising:

A flange with a first diameter (5 in Fig. 1) and a shank with a hollow cavity extending from the flange (12), wherein the shank is a straight cylinder (8) with outer diameter smaller than the first diameter, the shank defining a hollow cavity (8), and a conical section tapered from a shank end and converging towards the flange (10) at angle  $\alpha$  (bottom of Fig. 1) and a straight cylinder section with an inner diameter extending from the conical section (10), wherein the shank has a substantially flat ring-shaped end surface with an outer diameter and radial length (10), and wherein the angle  $\alpha$  of the conical section ranges between 70° and 110° (line 55 from part II of the specification, as well as that from Claim 3, and visually from the bottom of Fig. 1).



As for Claim 2, Singh discloses a self-piercing rivet wherein the thickness of the shank at the straight cylinder section of the hollow cavity is 25 to 45% of the outer diameter of the shank  $((d1-d2)/2) = 6$  in Fig. 1)

As for Claim 3, Singh reveals a self-piercing rivet, wherein the axial length of the flange is 5 to 20% of the outer diameter of the shank (H compared with d2).

As for Claim 4, Singh illustrates a self-piercing rivet wherein the entire length of the shank is the sum of the overall thickness of the workpieces and a die thickness of the rivet-fastening device (Fig. 1).

As for Claim 5, Singh makes known a self-piercing rivet wherein the entire length of the hollow cavity (L-H in Fig. 1) in the shank is greater than 70% of the overall thickness of the workpieces (D in Fig. 1).

As for Claim 6, Singh discloses a self-piercing rivet wherein the radial length of the end surface of the shank is between .2mm and .6mm (representative by the separate outer ends of d2 in Fig. 1).

As for Claim 8, Singh shows a self-piercing rivet wherein the radial length of the end surface of the shank is between .2mm and .6mm (representative by the separate outer ends of d2 in Fig. 1).



As for Claim 9, Singh illustrates a method of coupling a pair of workpieces comprising:

Providing a fastener having a flange with a large diameter (D in Fig. 1) and a shank with a hollow cavity extending from the flange (12 in Fig. 1), wherein the shank is a straight cylinder with outer diameter defining a hollow cavity (8), the shank defining a conical section tapered from a shank end and converging towards the flange at angle  $\alpha$  (10 in Fig. 1) and a straight cylinder with inner diameter extending from the conical section to an end on the flange side, wherein the shank has a substantially flat ring-shaped end with outer diameter and radial length (10), and wherein the angle  $\alpha$  of the conical section ranges between 70° and 110° (line 55 from part II of the specification, as well as that from Claim 3, and visually from the bottom of Fig. 1); and

Striking the fastener so as to deform and expand the shank outwardly in a radial direction (Fig. 4, as well as from line 45 in part I of the specification, stating, "...the resulting higher expansion force causes the radial movement of the rivet shank outward")

As for Claim 13, Singh discloses a method wherein striking the fastener is striking the fastener so as to form an undercut (30 in Fig. 4, as well as from line 44 in part 3 of the specification stating, "...shows the large undercut...").



As for Claim 14, Singh reveals a self-piercing rivet for coupling a plurality of workpieces comprising:

A flange (5 in Fig. 1);

A shank having a body with an outer radius smaller than a radius of the flange ( $d_2$  compared with  $D$  in Fig. 1), the shank defining a hollow cavity (8), the shank having a conical tapered section having an angle between  $70^\circ$  and  $110^\circ$  (line 55 in part II of the specification, as well as that from Claim 3, and visually from the bottom of Fig. 1).

As for Claim 15, Singh shows a self-piercing rivet wherein the hollow cavity has a diameter of 25 to 45% of the outer radius ( $d_2-d_1$  in Fig. 1 compared with  $d_2$ ).

As for Claim 16, Singh discloses a self-piercing rivet wherein the length of the flange is 5 to 20% of the diameter of the outer diameter ( $H$  compared with  $d_2$  in Fig. 1).

As for Claim 17, Singh illustrates a self-piercing rivet defining a flat end surface adjacent the conical tapered section, wherein the radial length of the end surface of the shank is between about .2mm and .6mm (representative by the separate outer ends of  $d_2$  in Fig. 1).

As for Claim 18, Singh shows a self-piercing rivet wherein the pair of workpieces have a first thickness and wherein the cavity (8) has a length ( $L-H$ ) of the 70% of the first thickness (Fig. 1 to Fig. 4).



As for Claim 19, Singh, illustrates a self-piercing fastener for coupling a plurality of workpieces comprising:

A cylindrical shank body defining a hollow cavity (8), said cavity defining a conical tapered conical section having an angle between about 70° and about 110 (line 55 in part II of the specification, as well as that from Claim 3, and visually from the bottom of Fig. 1), said cavity further defining a concave surface (10 to the end of d2), said cavity further defining and upper end defining a concave surface (12 in Fig. 1).

As for Claim 20, Singh discloses a self-piercing fastener wherein the concave surface defines an interior angle of about 160° (Concave angle at the top of the hollow cavity (8) in Fig. 1).

As for Claim 21, Singh makes known a self-piercing fastener wherein the shank further comprises a flat ring-shaped end surface adjacent the conical tapered section (representative by the separate outer ends of d2 in Fig. 1).

As for Claim 22, Singh shows a self-piercing fastener wherein the shank defines a thickness between shank outer surface and a shank inner surface, the thickness being between about 20% to about 45% of an outer diameter of the shank outer surface ( $(d2-d1)/2$  = a thickness between shank outer surface and a shank inner surface (6 from Fig. 1).



***Claim Rejections - 35 USC § 103***

- [7]** The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

- [8]** Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh U.S. Patent US 2001/0006321 A1 in view of (NPL, eFunda.com, see enclosed print out).

Singh teaches of the above claims as discussed earlier in this detailed action.

However, Singh fails to disclose expressly the necessity to heat treat the entire rivet to prevent stress corrosion.

efunda.com teaches that heat treatment is often associated with increasing the strength of material, but it can also be used to alter certain manufacturability objectives such as improve machining, improve formability, restore ductility after a cold working operation. Thus it is a very enabling manufacturing process that can not only help other manufacturing process, but can also improve product performance by increasing strength or other desirable characteristics, such as preventing stress corrosion.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the self-penetrating fastening system taught by Singh, to a heat treatment taught by eFunda, in order to help deter possible stress corrosion to the rivet.



**[9]** Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh U.S. Patent 6,385,843 in view of (NPL, arrowfastener.com-see enclosed print out).

Singh teaches of the above claims as discussed earlier in this detailed action.

However, Singh fails to disclose expressly the specific type of materials that the rivet can be made of.

Arrowfastener.com teaches that some variations in compositions in rivets include those in steel, stainless steel, and aluminum. Continuing, steel rivets are pertinent for heavy duty jobs and when riveting steel to steel. Aluminum rivets are extremely useful for lighter weight jobs and materials such as aluminum, fabrics, plastics, etc.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the rivet as taught by Singh, to an array of diverse materials for the composition of rivets as taught by arrowfastener.com, in order to maximize the fastening stronghold by choosing the appropriate material composition of the rivet for the specific metal the rivet is penetrating.

**[10]** Claim 12 is rejected under 35 U.S.C 103(a) as being unpatentable over Singh U.S. Patent 6,385,843 in view of (NPL, eFunda.com, see enclosed print out).

Singh teaches of the above claims as discussed earlier in this detailed action.

However, Singh fails to disclose expressly the rationale and usage of reducing the temperature of the fastener to less than –100 degrees C.



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eFunda.com teaches the importance of heat treatment, and how cooling can alter the physical and mechanical properties of a metal without changing the products shape.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the rivet as taught by Singh, by subjecting the former to a cooling/freezing process that would allow a precise fit for the rivet into a discreet hole and also allowing the rivet to initially travel further into the materials. Also, as the temperature of the rivet increases once again, the metal will expand, creating a greater connection/bond between the rivet and the other materials to which it is being fastened.

**[11]** Claim 23 is rejected under 35 U.S.C 103(a) as being unpatentable over Singh U.S. Patent 6,385,843 in view of Korb et al. U.S. Patent 5,414,922.

Singh teaches of the above claims as discussed earlier in this detailed action.

However, Singh fails to disclose expressly the specific type of materials that the rivet can be composed of.

Korb et al., teaches of forming a pivot with an iron-based alloy to take advantage of the outstanding mechanical properties of the metal.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the rivet as taught by Singh, by subjecting the former to a iron-based creation to utilize the mechanical properties of the metal, and offer an alternative to the aluminum based alloys, specifically those with the purpose of inserting the pivot into steel rather than aluminum.




**Conclusion**

**[12]** The prior art made of record and not relied upon is considered pertinent to applicant's disclosure is as follows: Marko et al, U.S. Patent US 6,325,584 B1; Edwards, U.S. Patent 6,263,560 B1; Cotterill et al., U.S. Patent 5,752,305; Havener, U.S. Patent 2,465,534; Auriol et al., U.S. Patent 5,359,765; Mauermann et al., Mauermann et al., U.S. Patent US 6,763,568; Bora, U.S. Patent 5,722,144; and Hammond, U.S. Patent 5,299,667;

**[13]** Any inquiry concerning this communication or earlier communications from the examiner should be directed to David C. Reese whose telephone number is (703) 305-0590. The examiner can normally be reached on 7:30 am - 5:00 pm Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J.J. Swann can be reached on (703) 306-4115. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
ROBERT J. SANDY  
PRIMARY EXAMINER